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Treatment of oily streams contaminated with lipophilic pollutants by peroxide oxidation using catalysts developed from compost derived from municipal solid waste

J.L. Diaz de Tuesta[1,2,*], P. Praça[3], A.M.T. Silva[2], J.L. Faria[2], M.F. Barreiro[1,2], H.T. Gomes[1,2]

[1]Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, 5300-253 Bragança, Portugal

[2]Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials (LSRE-LCM), Faculdade de Engenharia, Universidade do Porto, 4200-465 Porto, Portugal

[3]Resíduos do Nordeste, EIM, S.A. Empresa Intermunicipal, Mirandela, 5370-340, Portugal - *jl.diazdetuesta@ipb.pt*

Nowadays, waste management through mechanical biological treatment (MTB) consists on the use of the separated organic fraction of municipal solid waste (MSW) to feed anaerobic digestion processes, resulting therein a solid stream, further processed to compost, which can be used in agriculture. Currently, the production of compost is higher when compared to its demand and expected developments on coming directives under "End-of-waste" criteria are leading to barriers on the use of fertilizers resulting from waste [1]. Within this context, the current work proposes an alternative strategy to the valorisation of compost, through the production of low-cost materials to be used in catalytic processes. Thus, several materials were prepared from compost obtained from a MTB plant for MSW. The compost was first mixed and washed with water, in order to homogenise and remove soluble compounds and suspend solids. Then, two different materials were prepared by carbonization at 400 (C-400) and 800 ºC (C-800). In addition, following the procedure previously described [2], two materials were prepared with H_2SO_4 before and after the carbonization at 800 ºC (C-S-800 and C-800-S, respectively). The materials were assessed in H_2O_2 decomposition and peroxide oxidation of three model pollutants with different lipophilic character, Sudan-IV (S-IV), 2-nitrophenol (2-NP) and 4nitrophenol (4-NP) in cyclohexane and water in order to simulate oily wastewater (Fig.1). The materials show catalytic activity in both H_2O_2 decomposition and peroxidation of the pollutants when compared to the non-catalytic runs. The most significant difference was found when C-800-S was used, since low conversions of H_2O_2 and 4-NP was achieved. However, the acidification of the sample resulted favourable in the oxidation of S-IV, leading to the highest conversion of this pollutant.

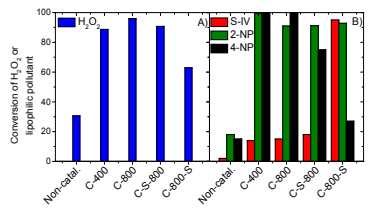

Fig.1. Conversion of (A) H_2O_2 in its respective decomposition runs and of (B) the lipophilic pollutants in the peroxidation runs.

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